The Management of Radioactive Waste from the Nuclear Medicine Sector

Peter Hayes
This is GE Healthcare

- Medical Diagnostics: From Organ to Cellular
- Diagnostic Imaging: From Anatomical Imaging to Molecular Imaging
- Services: From Maintenance to Hospital Productivity
- Life Sciences: From Molecular Discovery to Clinical Application
- Clinical Systems: From Modular, Hard Wired to Miniaturization and Connectivity
- Information Technology: From PACS to Clinical IT Systems

- Medical Diagnostic Services:
  - Nuclear medicines & diagnostics
  - Molecular Diagnostics

- Diagnostic Imaging Services:
  - CT, PET/CT
  - MR
  - X-ray

- Services:
  - Performance Solutions
  - Multi-Vendor Services
  - Asset Management

- Life Sciences Services:
  - Discovery Systems
  - Radiolabelling
  - Protein Separations

- Clinical Systems Services:
  - Ultrasound
  - Critical Care Systems
  - Anaesthesia Systems

- Information Technology Services:
  - PACS
  - RIS
  - HIS
  - CIS…
GE Healthcare UK

~ 2,700 multi-disciplinary staff across the country

Grove Centre MD 900
Pollards Wood
GEHC Global HQ 200

Amersham Place
MD/LS 200

Bedford CS 50
Hatfield CS 220

Gloucester MD 120
Cardiff LS 450
Oxford DI 50
Slough DI/CS/HCIT 450

# Employees by Business Unit
DI: Diagnostic Imaging
- Ultrasound
- Anaes. / Monitoring
MD: Med. Diagnostics
- Contrast Media
LS: Life Sciences
HCIT: Healthcare IT
## Radioactive Waste Categories

<table>
<thead>
<tr>
<th>Very low-level wastes (VLLW)</th>
<th>Low-level wastes (LLW)</th>
<th>Intermediate-level wastes (ILW)</th>
<th>High-level wastes (HLW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be disposed of with ordinary refuse.</td>
<td>Cannot be disposed of with ordinary refuse.</td>
<td>Heat does not need to be taken into account in designing storage / disposal / facilities.</td>
<td>Heat must be taken into account in designing storage / disposal facilities.</td>
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<tr>
<td>Each 1 m³ contains less than 4 MBq of β/γ activity.</td>
<td>Not exceeding 4 GBq per tonne of alpha activity, or 12 GBq per tonne of beta/gamma activity.</td>
<td>Wastes exceeding LLW limits</td>
<td>Wastes whose temperature may rise significantly as a result of their radioactivity.</td>
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<tr>
<td>Single item contain less than 40 kBq.</td>
<td>Authorisations can relax the C-14 and H-3 concentration limits by factor 10.</td>
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</tbody>
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Radioactive Waste Regulation

Safety of workers and the general public
The main legislation covering the safety of workers and the general public at nuclear installations in the UK is the Health and Safety at Work etc Act 1974 The Nuclear Installations Act 1965 (as amended) and the Ionising Radiations Regulations 1999. These are enforced by HSE.

Radioactive waste management on nuclear licensed sites
The way in which radioactive waste is managed on licensed nuclear sites is set out in the conditions attached to the nuclear site licence and is enforced by HSE.

Disposal of radioactive waste from nuclear licensed sites
The disposal of radioactive waste, including airborne and liquid discharges from sites and transfers of waste between sites, is regulated by the EA and SEPA in Scotland, under the Radioactive Substances Act 1993 and the Environment Act

Transport of radioactive waste
The Competent Authority in the UK for approving packages for transporting radioactive material Department for Transport.

Security
The Nuclear Industries Security Regulations 2003 aim to ensure the security of nuclear material and related equipment and information, and are enforced by OCNS.
GE Healthcare’s Waste Routes

Key
- Incineration Routes
- ILW Routes
- LLW Routes
- VLLW Routes

LLW Treatment at WMTL, Winfrith for Disposal to LLWR
LLW Treatment at Sellafield for Disposal to LLWR
LLW Disposal to Low Level Waste Repository Ltd
LLW Treatment at UKAEA (RSRL) for Disposal to LLWR

Incineration Pyros Environmental
Incineration Lakeside Rd Slough
Incineration White Rose Knostrop
Incineration White Rose Eastcroft
Incineration Porton Down

The Maynard Centre
B10.23 Harwell

The Grove Centre
B443.26 Harwell

ILW (Tritium) Transfer to AEA Winfrith
ILW Transfer to BNFL MBGWS
ILW Transfer to UKAEA Harwell

DISPOSAL of VLLW
Radioactive Waste Arisings

Manufacturer of a range of radioactive pharmaceutical & life science products, resulting in production of LLW
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Legacy wastes from past radioactive manufacturing operations
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Legacy wastes from past radioactive manufacturing operations

Decommissioning waste from redundant plant and buildings is a significant proportion of total arisings
Operational Considerations

GE Healthcare waste & decommissioning costs are fully provided for.

Waste costs form a significant portion of the provision.

Application of Best Practicable Means at all stages of waste generation and management.

Minimise the generation of radioactive waste arising for disposal or storage by adherence to the ‘waste hierarchy’

The Waste Hierarchy as implemented at GEHC
Intermediate Level Waste

Very few disposal routes for ILW

Waste is stored pending a national solution which will not be in place before 2050

Waste will need to be “Conditioned” prior to disposal to the National Repository
Intermediate Level Waste
Low Level Waste

LLWR Ltd Conditions for Acceptance (CFAs) are detailed and waste requires complex processing to demonstrate BPM and to meet CFAs and ensure best value for money.

Frequent changes to CFAs require resource to review and modify waste processing.

Documentation and process of waste transfer could be streamlined.

LLWR is becoming more restrictive on acceptance of waste forms.
Low Level Waste
Interactions With LLWR Ltd

LLWR Ltd contract extended 6 months to March 09
LLWR Ltd propose new 5 year contract to give stability

BUT

- Proposal will include modified CFAs with waste segregation services
- Segregation services will divert waste from LLWR to recycle or other disposal routes
- Segregation services to be developed
- Delays in 5 year contract proposals creating uncertainty - costs
- Uncertainty of segregation services and future CFAs
The Future of LLWR

Cumbria County Council anticipate an 8 year life span in its planning permission for LLWR Vault 9

LLWR segregated proposals will extend the operational life of Vault 9

**BUT**

- By how much will this extend operation?
- What happens after Vault 9 is full?
- Waste to be placed in Vault 9 will be in “storage” rather than disposal?
- What happens if planning permission for disposal is refused?
Conclusions

Need for clarity on the future access to LLWR
Need for clarity near term longevity of LLWR
Require speedy resolution to new contract proposal and CFAs
Need certainty to plan the future of a fast moving, vital healthcare business.